ABSTRACT

A resonant-type transducer providing a narrow band, high output or high sensitivity signal to a radiation medium, the resonant transducer comprising a vibrator body comprising piezoelectric or electrorestricitive material having a first acoustic impedance at a resonant condition, and a matching layer for acoustically matching the piezoelectric vibrator body at resonance to the radiation medium. Another type of a matching layer structure comprising a first layer of material of a first thickness t_1 and acoustic impedance Z1 and having an inner surface coupled to a front surface of the vibrator body, and a second layer of material of thickness t_2 and acoustic impedance Z2 and having an outer surface coupled to the radiation medium wherein the second layer has a high acoustic impedance relative to the first layer and wherein the second layer has a thickness of less than one quarter wavelength of the resonant frequency so as to cause a reflection from the high impedance layer to provide a combined impedance of the matching layer at the front surface of the vibrator body which is less than the acoustic impedance of the radiation medium. These matching layer structures provide increased output power and also higher receiving sensitivity for resonant type transducers.